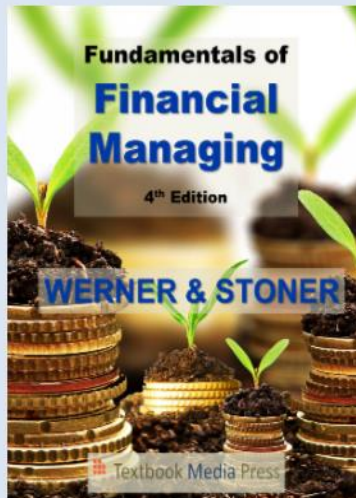


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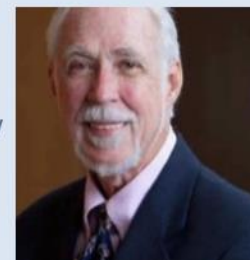
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and Appendices



Frank Werner
Fordham University



James Stoner
Fordham University



3 things about Werner/Stoner 4e:

1. Designed to provide undergrads a contemporary taste of financial management
2. Incorporates globalization/ethics/small business
3. Delivers solid financial theory and practical applications

- Completely updated to incorporate changes and recent developments in the business world and the area of finance.
- A tightly integrated chapter structure that begins with a set of learning objectives entitled “Key Points You Should Learn from This Chapter.” These points correspond precisely to the A-heads, or major sections of the chapter. At the end of each chapter is a “Summary of Key Points” that repeats and reviews the learning objectives.
- Chapter opening and closing vignettes that describe a scenario faced by a finance professional and are designed to involve your students in the material by putting them “on the job.”
- Examples of current practices of world-class companies in highlight boxes that cover “Finance in Practice,” “Serving Finance’s Customers,” “Improving Finance’s Processes,” and “Contributing to Global Sustainability.”
- Frequent, clearly labeled, fully worked-out examples in a standard format, a problem scenario paragraph followed by a “Question,” “Solution steps,” and “Answer.” When a problem requires time value of money analysis, the calculation is shown using both a financial calculator and a spreadsheet program.

More Key Features of the 4th Edition



- Appeal to intuition rather than to formula so students can truly understand the concepts rather than just memorizing a formula.
- NET Present Value boxes – references to interesting and useful websites throughout the book.
- Extensive questions and homework problems.
- A set of Web-based cases.
- Web-based appendixes to most chapters that into further depth than the material in the book instructors who wish to delve further.
- Summaries of all mathematical relationships and financial ratios introduced in the book.

88 Part II About Finance and Money

Solution steps:

Clear TVM	Rate	10000 as (FV)	12 as (I/Y)	1 as (N)	Compute (FV)
Clear TVM	Rate	100000 as (FV)	12 as (I/Y)	30 as (N)	Compute (FV)

Answer: The present value of the one-year investment falls to \$89,286 while the present value of the 30-year investment **falls much further** to \$52,948.

Question: What happens to the present value of each investment if investor's required rate of return falls to 9%?

Solution steps:

Clear TVM	Rate	10000 as (FV)	9 as (I/Y)	1 as (N)	Compute (FV)
Clear TVM	Rate	100000 as (FV)	9 as (I/Y)	30 as (N)	Compute (FV)

Answer: The present value of the one-year investment falls to \$92,593 while the present value of the 30-year investment **plum much further** to \$157,641.

Financial managers study interest rates as they plan future business activity. They forecast the future level of rates to plan the level of their investment and financing actions. They forecast the speed with which rates might change to plan the timing of their investment and financing actions. Financial managers who anticipate and respond wisely to interest rates can add significant value to their organization.

The Components of Interest Rates

A particularly useful way to study interest rates is the model of the economist Irving Fisher.¹ In Fisher's model, any interest rate may be subdivided into three components: a pure rate of interest, a premium for inflation, and a premium for risk. As with other interest rate calculations, the proper formulation of this model requires multiplication by terms of the form (1 + x) to ensure that the three effects "compound" upon each other:

$$\text{Nominal rate} = (1 + \text{pure rate}) (1 + \text{inflation premium}) (1 + \text{risk premium}) - 1$$

$$= (1 + r_p) (1 + r_i) (1 + r_r) - 1$$

¹Reference: Irving Fisher, "Appreciation and Interest," *Publications of the American Economic Association*, Aug. 1906.

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Where to find it: Web-based appendixes and cases can be found at the *Fundamentals of Financial Managing* section of the Textbook Media website: www.textbookmedia.com

T O T H E I N S T R U C T O R

Thank you and congratulations for adopting this book. We and the many leading finance professionals throughout North America who encouraged us to write it and who reviewed our work think you have made an important decision for your students, for global competitiveness, and for global sustainability. Change is never easy, as we ourselves found out when we began asking the questions that led to this textbook.

Fundamentals of Financial Managing is a different kind of undergraduate finance text. Although all financial management texts cover finance, we know of no other undergraduate “financial management” textbook that has anything to do with management or that addresses the implications of sustainability for finance. We’re excited about the book since we believe this is the way we will all be seeing finance in the coming years. We hope we’ve communicated our excitement to you and your students

1. Our Goals for the Book

In writing *Fundamentals of Financial Managing*, we set seven goals for ourselves:

To present finance in a clear and consistent manner The book is designed—through its choice of language, illustrations, and design—to be easy to read and use. The approach for analysis and problem-solving is straightforward and is applied consistently. The book is approachable and user-friendly, thanks to features such as its realistic cases and problem scenarios, cartoons, hypertext cross-references, and dual glossary.

To organize the book based on the way financial managers conceive their work The flow of the book is consistent with the financial managing job: raising money, using money to add value to the firm, and returning value to shareholders. This makes it easier for students to understand the “big picture.”

To make the book consistent with the direction of business education The book includes extensive material in response to four concerns of contemporary business education: (1) globalization, (2) ethics, (3) cross-disciplinary activities, and (4) small business. International content is integrated throughout the book. Ethics appears naturally in the context of the worldwide quality-management and sustainability revolutions. Cross-disciplinary activity, a requirement in modern business practice, is explicitly addressed wherever financial decision making is discussed. The special needs and limitations of small business appear throughout the book, making it applicable to organizations of all sizes.

To capture the implications of the quality and sustainability revolutions for financial practice The book uses the experiences of leading companies to report the progress finance organizations are making in identifying and serving finance’s customers, in improving finance’s processes, and in contribut-



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ing to global sustainability. A consistent theme throughout the book is bridging the gap between traditional and new management practices, a current fact of life for finance professionals we refer to as “living in both worlds.”

To equal or surpass the best features of other textbooks We benchmarked over 50 features of both finance and nonfinance texts, looking for the best example(s) of each, and set out to do as well or better on every one.

To provide instructors flexibility in using the book The book contains full coverage for an introductory course of either one or two semesters. It can be used in a traditional financial management course, or in a survey of finance course since its broad coverage introduces many areas of finance, not just large corporation financial management. We have put more-advanced subjects, more-detailed explanations, and derivations on the web in “Web Appendixes” to provide greater flexibility in selecting and assigning materials. Cross-reference footnotes connect material that appears in multiple chapters, helping instructors and students alike to tie pieces of the finance subject together.

To keep the size of the book reasonable Even with all its new coverage, the book has only 18 chapters.

2. Advantages for Students, Instructors, and Society

We think there are important advantages to a finance book that is consistent with the best management practice.

For students The approach of *Fundamentals of Financial Managing* makes students more attractive to employers, not only by teaching them the core competencies of finance but also by showing them how to use those skills effectively within a modern, world-class organization.

For instructors *Fundamentals of Financial Managing* permits instructors to teach best practice—financial managing as it is done in companies recognized as business leaders. It supports teaching, as students find the book intuitively clear and easy to read and understand. By integrating international and ethical issues throughout the book, it builds those subjects naturally into students’ analyses and removes the need to treat them as separate topics.

For society *Fundamentals of Financial Managing* joins the increasing supply of educational materials attempting to change the way business schools prepare their students. Business is changing so fast today that schools often have understandable difficulty keeping up. The observation of Walt Kelly’s lovable cartoon possum, Pogo, that “We have met the enemy, and it is us!” has been applied with some wisdom to business education. *Fundamentals of Financial Managing* is our contribution to moving business schools from being “part of the problem” to a “part of the solution” of educating students to compete successfully in today’s global markets and to contribute to global sustainability.

3. Who Should Use the Book

Because of its tone and approach, *Fundamentals of Financial Managing* has been appreciated by instructors, students, and employers alike. We think the book is especially appropriate for nontechnical students, since it minimizes the use of derivations and formulas, and for students who are employed full- or part-time and who will immediately see the validity of the book’s approach and its relevance to their work. Its graduate-level sibling, *Modern Financial Managing—Continuity and Change*, has been successfully used at the M.B.A., and executive M.B.A. levels and was reviewed during its development both by professors and senior financial executives from some of North America’s leading companies.

4. Pedagogical Aids

We have included many pedagogical aids to make your job of teaching easier and your students’ job of learning more rewarding and more fun. Among the features to look for and take advantage of are:

Tightly integrated chapter structure Each chapter begins with a set of learning objectives entitled “Key Points You Should Learn from This Chapter.” These points correspond precisely to the A-heads, or major sections of the chapter. At the end of each chapter is a “Summary of Key Points” that repeats and reviews the learning objectives.

Chapter opening and closing vignettes Each opening vignette describes a scenario faced by a finance professional and is designed to involve your students in the material by putting them “on the job.” Each closing vignette shows how the concepts of the chapter can be used to address the opening issue. Since the closing vignettes do not give a single definitive answer (there rarely is one), the opening story can be used as a case for class discussion, homework, or examinations.

Presentation of current finance practices of world-class companies (and some not quite so accomplished) Four types of boxes are scattered throughout the book. “Finance in Practice” boxes describe recent activities of companies and business leaders as well as modern applications of finance theory. “Serving Finance’s Customers” boxes illustrate how a finance organization can add value by meeting the needs of its internal and external customers. “Improving Finance’s Processes” boxes describe examples of adding value to a corporation by doing finance’s job more efficiently and effectively. “Contributing to Global Sustainability” boxes illustrate how financial activities can enhance the environment and society.

Frequent, clearly labeled, fully worked-out examples Students learn from examples, and we have tried to err on the side of too many rather than too few. Where the examples are closely linked to finance theory, we often have presented the example first followed by the theory, rather than the other way around, so that the theoretical concepts may be related immediately to a shared and understood example. Examples are in a standard format: a problem scenario paragraph followed by a “Question,” “Solution steps,” and “Answer.” Often the “Answer” contains further commentary to enhance students’ understanding of the example.

Appeal to intuition rather than to formula While some students are very comfortable with mathematical presentations, all too many are not and never learn finance because of their “math anxiety.” This is a shame because the majority of finance can be a very intuitive subject. We have avoided formulas wherever possible or placed them in Web Appendixes where they are available for those who find them helpful. We have standardized the notation in the algebra that is included: in all cases, capital letters stand for a money amount (e.g., PV for present value) while lower case letters stand for a rate (e.g., t for the marginal tax rate).

Use of the financial calculator and spreadsheet for time-value analyses We have purposely minimized the use of time-value tables with this text. Although some instructors find the tables useful for illustrating the basic time-value relationships, financial calculators and spreadsheet programs are universal tools in business today. It is the rare finance professional who does not use them; it is the rarer finance professional who still uses time-value tables. Also, it is often cheaper for a student to purchase a calculator than to buy the textbook itself. All problems involving time value are fully worked out, showing the correct keystrokes and spreadsheet functions. At the end of the book you will find a calculator appendix “Using Your Financial Calculator” illustrating the location of each time-value key on the most widely used financial calculators and a “Spreadsheet Functions” appendix listing financial functions in Microsoft Excel and Corel Quattro Pro. By illustrating how each time-value example may be solved with calculators and spreadsheets, the book provides students with extensive hands-on experience. Another advantage of this approach is that our examples can be much more realistic and not confined to a narrow set of interest rates or time periods.

Use of visual aids Charts and tables are used throughout the book to support learning. Each discussion of financial market instruments features a copy of the

relevant quote(s) from a recent edition of *The Wall Street Journal*, the FINRA website, or the Bloomberg.com website, as seen “Through the Looking Glass” in which we magnify a section of the newspaper to study the numbers in more detail.

Complete glossary, both in the margin, and at the end of the book

The marginal glossary defines terms as they are encountered in the text, so students have the definitions when they need them. The end-of-text glossary is a reference students can go back to when they review and study. Also, the end-of-text glossary serves as a second index since each definition contains the number of the page on which the parallel marginal definition appears.

Questions that follow each chapter We have tried to make the chapter-ending questions both thought-provoking and useful for reviewing the chapter concepts. They may be used for homework, class discussion, or examinations.

Extensive set of homework problems The problems that follow each chapter are presented in the same order as the chapter material and are clearly labeled to identify the topic(s) they refer to. Problems come in pairs: problems 1 and 2 cover the same material; so do problems 3 and 4, problems 5 and 6, etc. You can assign one problem of each pair for homework and keep the other in reserve for classroom work, examinations, or for the student who asks for additional examples. The problems range from the simple to the complex—the first problems are narrowly targeted at specific concepts and relationships, while the later problems tend to be broader and integrate the chapter materials. Most problems have multiple parts in which the value of one variable is systematically changed. Students may do all the parts at one sitting or may save one or two parts for later review. When all parts of a problem have been completed, they illustrate the sensitivity of the result to the variable that was changed, providing another learning opportunity.

Accompanying web-based cases These cases provide additional opportunities to explore the chapter concepts and may also be used for assignments and examinations.

End-of-book summary of mathematical relationships and summary of financial ratios

These handy summaries can be used as study aids by students. They are also useful as reference materials for examinations if you permit students to bring in a list of formulas.

“NET Present Value”—references to interesting and useful websites

These references, which appear throughout the book in the margin, direct students to interesting sites on the “net” where they can learn more about a topic and see practical, real-time applications of finance.

5. Supplements

We are creating a full set of supplements to accompany the book. For this edition there are:

- A **solutions manual** with answers to all questions and detailed, step-by-step solutions to all problems.
- A **set of web-based appendixes and cases** that extend the concepts of the book.
- A **test bank** with short-answer questions and problems available both in hard copy and on diskette for Macintosh and PC-compatible computers.
- **PowerPoint™ slides** for each chapter to support and supplement classroom presentations containing the chapter content plus formulas, figures and tables from the text.

Additional supplements planned for the future include:

- A **study guide** containing an outline of each chapter, worked out sample problems, and self tests.
- A **CD-ROM** containing computerized versions of various end-of-chapter problems which may be used with many popular spreadsheet programs.
- A **CD-ROM** containing “listen to the Authors” audio files in which we discuss and elaborate concepts presented in the book.

For both instructors and students there are five books summarizing our research findings:

- *Joining Forces—Integrating Shareholder Value and Quality Management*, published by Fordham University Graduate School of Business. This monograph reports on a 1996 seminar at Fordham in which senior finance and other executives presented their progress in adopting shareholder value management and measurement systems, such as Stern Stewart’s Economic/Market Value Added and the Boston Consulting Group’s Total Shareholder Return/Cash Flow Return on Investment.
- *Internal Audit and Innovation*, published by the Financial Executives Research Foundation (FERF) in 1995. Written for executives and practitioners, this book reports on how the internal audit groups of five companies—American Standard, Baxter International, Gulf Canada Resources, Motorola, and Raychem—have changed their auditing philosophies and practices to be more consistent with their evolving management systems. FERF, the research arm of the Financial Executives Institute, was the generous sponsor of this research.
- *Managing Finance for Quality—Bottom-Line Results from Top-Level Commitment*, published by ASQ Quality Press and the Financial Executives Research Foundation in 1994. Also written for executives and practitioners, this book reports how the quality management revolution is changing financial management practice. The book includes case studies of five quality-leading companies—Corning Incorporated, Federal Express, Motorola, Solectron, and Southern Pacific. FERF was also the generous sponsor of this research.
- *Finance in the Quality Revolution—Adding Value by Integrating Financial and Total Quality Management*, published by the Financial Executives Research Foundation in 1993. This shorter version of *Managing Finance for Quality* contains

an executive summary, the five case studies, and a chapter on “Lessons Learned.” It was published for and distributed to the 11,000 senior financial executives and academics who are members of the Financial Executives Institute.

- *Remaking Corporate Finance—The New Corporate Finance Emerging in Quality-Leading Companies*, published by McGraw-Hill Primis in 1992. A monograph describing transformations in finance work as seen through the observations of senior executives from leading corporations, venture capitalists, consulting organizations, and universities.

6. Moving Forward Together

We have worked very hard to make *Fundamentals of Financial Managing* an exciting and superior textbook. However, we believe that everything is subject to continuous improvement, and we know that you all have wonderful ideas that could enhance the book and its supplements. We would love to hear from you. Tell us how we can (further) assist your teaching in any way; help us make the book better. Feel free to contact us any time at:

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You are our customers, and delighting you and exceeding your expectations is and will always be our primary goal.

Acknowledgments

Writing a textbook takes the efforts of many people over many years. We extend our hearty thanks to all of them. Although we will never be able to thank each person adequately, we wish to identify those who played a particularly important role in the book’s development.

1. Genesis

The beginnings of this textbook were the teaching materials Frank Werner developed for use in his finance classes at Fordham University and in the *Management Training Program—Finance* at Manufacturers Hanover Trust Company, now part of JPMorganChase. Thanks go to Corporate Professional Development staff at Manufacturers Hanover—especially Mort Glantz, Carol Johnson, Tom Kennedy, Tom McCaskill, Charlie Stipp, and Barbara Taylor—who helped Frank to identify the best content and sequencing of the materials, and to Dale Broderick, who, more than any other teacher, taught Frank how to write for the classroom.

In 1989, Frank and Jim began their work on the interrelationships between financial managing, globalization, and quality management by conducting the first of a series of graduate seminars with that theme. The seminars led to our stimulating and fruitful relationship with the Financial Executives Institute's research arm, the Financial Executives Research Foundation (FERF). FERG's research grants, and the strong support of Roland Laing and Bill Sinnett, gave us exceptional opportunities to learn from many CFOs and other financial executives of companies that are leaders in changing financial management practice. These financial executives are showing how finance can add increasing value to their companies by recognizing and taking advantage of the opportunities arising from the integration of globalization, technology, quality management, sustainability and financial practice. Many of the examples in this book are drawn from their successes.

We owe a great intellectual debt to the finance and quality professionals throughout the United States who taught us quality management and how it must be an integral part of the job of financial managing. In particular, we wish to single out:

Fred Allerdycce, CFO, American Standard	Ralph Karthein, Controller, IBM Canada
David Baldwin, former CFO, Florida Power and Light	Bob Lambrix, former CFO, Baxter International
Len Bardsley, former Manager, Continuous Improvement, Du Pont	Bill Latzko, President, Latzko Associates
Richard Buetow, VP and Director of Quality, Motorola	Ken Leach, VP Administration, Globe Metallurgical
Chauncey Burton, Senior Quality Administrator, Finance, Federal Express	Karen May, VP, Corporate Audit, Baxter International
Jim Chambers, Assistant Treasurer, Corning Incorporated	Paul Makosz, General Auditor, Gulf Canada Resources
Winston Chen, former Chairman, Solectron	Ko Nishimura, President and CEO, Solectron
W. Edwards Deming, consultant	Gabriel Pall, Vice President, The Juran Institute
Joe Doherty, Assistant VP—Finance, Southern Pacific	James F. Riley, Vice President, The Juran Institute
Keith Elliott, CFO, Hercules Corporation	Pete Sale, Team Member—Finance Reengineering, Baxter International
Bill Fitton, Senior Manager, Corporate Financial Audit, Motorola	Paul Schnitz, Director, Corporate Operations Review Group, Raychem
Justin Fox, Director—Quality, Southern Pacific	Bob Siminoni, Director of Strategic Planning, Treasury, Westinghouse
Blan Godfrey, Chairman and CEO, The Juran Institute	Ben Stein, VP and General Auditor, American Standard
Larry Grow, VP and Director of Corporate Financial Planning, Motorola	Kent Sterett, Executive VP, Quality, Southern Pacific
Sandy Helton, VP and Treasurer, Corning Incorporated	Kent Stemper, Director, Corporate Audit, Baxter International
David Hickie, former Executive VP and Vice-CFO, Motorola	Bob Talbot, VP, Management Services, IBM Credit Corporation
Alan Hunter, CFO, Stanley Works	Susan Wang, CFO, Solectron
Ken Johnson, VP, Corporate Controller, and Director of Internal Audit, Motorola	Len Wood, Corporate Operations Review Group, Raychem
Joseph M. Juran, Chairman Emeritus, The Juran Institute	Larry Yarberrry, CFO Southern Pacific

At Fordham, Frank and Jim have had the good fortune to work with excellent colleagues in an environment where good teaching is encouraged and supported. Our faculty colleagues, particularly Victor Marek Borun, Sris Chatterjee, John Finnerty, Gautam Goswami, Steven Raymar, Allen Schiff, Robert Wharton, and Milan Zeleny continue to provide much of that environment. Our deans past and present of the Fordham Schools of Business—Susan Atherton, Arlene Eager, David Gautschi, Robert Himmelberg, Janet Marks, Lauren Mouny, Donna Rapaccioli, Ernest Scalberg, William Small, Sharon Smith, Arthur Taylor, Maureen Tierney, and Howard Tuckman—have consistently supported us emotionally and financially. Bobby Wen repeatedly played key roles in the early seminars and courses we conducted.

2. Modern Financial Managing—Continuity and Change

In December 1991 we were introduced to Kirsten Sandberg, finance acquisition editor at HarperCollins College Publishers. Kirsten was quick to see the potential of our approach and immediately understood our desire to produce a family of textbooks using quality management techniques. In a large sense, our first textbook, *Modern Financial Managing—Continuity and Change*, would not have existed if it were not for her unfailing energy, good humor, and consistent faith in us and the project. Ed Yarnell worked closely, patiently, and creatively with us in the final crunch, and arranged for our work to be read by the following academic and professional reviewers who responded to the manuscript in its various stages of completion and who gave us many good ideas for improvement:

Peter Bacon, Wright State University
 Omar M. Benkato, Ball State University
 T. K. Bhattacharya, Cameron University
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 Philip M. Van Auken, Baylor University
 Charles H. Wellens, Fitchburg State University
 Len Wood, Raychem Corporation
 Thomas V. Wright, St. Louis University
 Robert M. Zahrowski, Portland State University

As we began to create *Modern Financial Managing*, we class-tested each chapter extensively in the introductory courses at Fordham University. Hundreds of students provided written feedback as they read each chapter. While it is impossible



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to single out each by name, they are responsible for many of the book's examples and innovations. Particular thanks go to Fordham professors Christopher Blake, Sris Chatterjee, Iftekhar Hasan, and Rohinton Karanjia who used draft sections of the book in their classes and provided valuable feedback.

3. Fundamentals of Financial Managing

With the successful publication of *Modern Financial Managing—Continuity and Change*, we turned to writing *Fundamentals of Financial Managing*, the second book in the family. We were fortunate to have the support of Trond Randøy, Cynthia Leonard, and the excellent staff at Authors Academic Publishing as we prepared the first edition of this book.

When Authors Academic Publishing closed its doors, we discovered the new, exciting, and innovative textbook distribution concept developed by Textbook Media Press. Like the people at Textbook Media, we believe that the price of traditional textbooks has become far too high. Our thanks go to Ed Laube and Tom Doran of Textbook Media who made the second and third editions possible and who pioneered the process to bring it to students at a price they can afford.

Particularly special thank yous go to Philip Schrömbgens, Kyle Houghton, Phungporn (Bee) Jaronjetjamnong, John Fernandez, Elizabeth Tam, Shui Hwang, and Cara Jacaruso, Frank's graduate assistants at Fordham, who worked closely with Frank and Jim to prepare the manuscript. Philip managed the computer files, designed page layouts and edited text and artwork to produce the first edition. Kyle, Bee, and John picked up where Philip left off and produced the second edition. Elizabeth and Shui produced the third edition. Cara produced this fourth edition. Their skill and creativity improved immeasurably the quality of this book, and we are most grateful for all their efforts.

A special thank you goes to Eric Werner whose brilliant sense of humor and artistic skill are responsible for most of the cartoons of this edition.

4. And, of Course . . .

Finally, we both feel a debt of love and gratitude to our families—Marie, Allison, and Eric; and Barbara, Alexandra, and Carolyn—who accepted our many late nights at the office and frequent trips to visit finance and quality professionals with very few complaints and many warm welcomes upon our return. For both of us they formed our ultimate support system.

T O T H E S T U D E N T

Welcome to *Fundamentals of Financial Managing*. We have tried to make the book easy to read and learn from and a lot of fun as well. Unlike many introductory finance books, this one talks about two facets of finance: analytical finance, the theory that guides financial analysis and decision making (which is in all finance texts), and operational finance, the way finance is practiced in world-class companies (which is in no other undergraduate finance text we know of). You are fortunate to have a professor who is forward-looking and in touch with the enormous changes taking place in business practice.

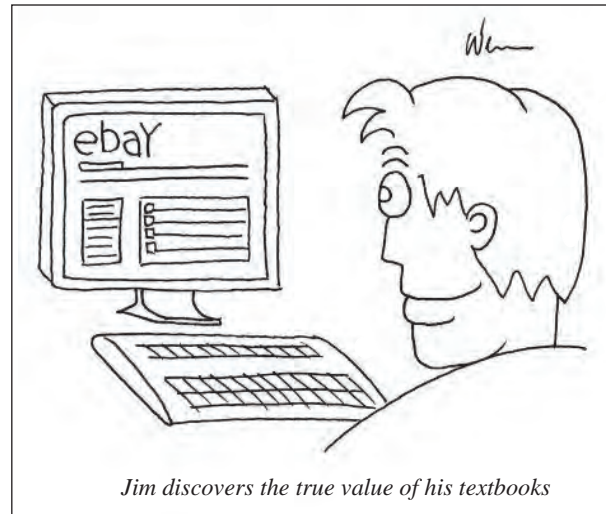
As you begin to study finance you are embarking on an exciting adventure, and we hope this book will be a good companion and guide. To help your learning further, we offer these suggestions:

Skim the entire book in advance Take an hour or so to look over the table of contents and to skim the glossary and index. Then read the “part openers,” the short sections that begin each of the six parts of the book, and read the section “Key Points You Should Learn from This Chapter” at the beginning of each chapter. By taking the time to do this at the beginning of the term, you will get a good overview of the subject and will be able to set each topic in the appropriate context when you get to it.

Read the section entitled “To the Instructor” It is always useful to know as much as possible of what is on your professor’s mind. In our comments to your instructor, we have written about what is new and special about this book. We have described some of the major features of the book—most of which were designed to make your work as a student easier.

Put yourself in the chapter opening vignettes Each chapter opens with a scenario you might find yourself in (or may already have been in) at some point in your business career. Before you read the chapter, think of how you might try to deal with the situation our characters are facing. As you read the chapter, relate the concepts to the vignette, and see how much more you could add. When you reach the end of the chapter, and read the closing vignette, match up your observations with those of the protagonist. While there is rarely a single “right answer,” finance provides helpful ways of approaching each problem. You will be delighted as you observe your thinking and analytical processes sharpen throughout the course.

Work each example problem you encounter while you are reading a chapter Take out your financial calculator or boot up your computer and go through the problem step by step. Doing each problem will reinforce your reading and help you to become proficient at using the financial calculator and/or



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spreadsheet which have become universal tools of financial professionals. You will learn more, and the new knowledge will stay with you longer.

Relate the examples about company practices to your experiences

If you have worked for a while, you may have been involved in or seen similar examples of financial practice. However, even if you have little or no work experience, you have been a customer of business for years. In many ways, all the examples talk about universal phenomena: serving customers, increasing quality, improving work, discovering when benefits exceed costs, finding the best way to do something. In what ways are these examples different or the same as those you have experienced? What could you have done differently if you had this knowledge back then? What about these examples makes them illustrations of “world-class” performance?

Use the footnotes labeled “Cross-reference” as a hypertext device

Whenever a reference is made to something that appears in another chapter, there is a footnote identifying that other location. Jump back and forth as needed to pick up and review supporting concepts.

Look carefully at the total results of each homework problem Where a problem has multiple parts, you may find yourself doing the same analysis several times. Feel free to do only one or two parts at first and come back to the rest later to reinforce your learning. However, when you have completed all parts of a repeating problem, look at the range of results. Observe how the results changed in response to the one variable that changed, an important insight beyond what is asked in the problem.

Take advantage of the end-of-book “Summary of Mathematical Relationships” and “Summary of Financial Ratios”

These handy pages include every formula in the book and serve as useful references when doing homework problems or preparing for examinations.

Use the end-of-book “Glossary” as a second index When you wish to review a concept, you can look up the definition of a related term in the glossary. At the end of the definition you will find the number of the chapter and page on which the term was first defined. Turn to that page, and you are at the beginning of the section to review.

Help us make the book better As we teach financial managing to our students at Fordham, we ask each student to write a weekly memo to us telling us how well we did each week as teachers and authors. Was the class clear and useful? Did this week’s chapter read well or make no sense? What didn’t you understand, and which parts of the chapter worked well for you? What could we do to make the book better? Hundreds of our students have written those memos. They have taught us a huge amount, and helped us to improve the book significantly. We invite all of you to join our Fordham students as we continue to improve the book. Please address any comments, criticisms, and suggestions to either of us at:

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Bronx, NY 10458

We promise to read your letters and consider them seriously for the next edition. You are the ultimate customers of our work, and as we have learned from our studies of world-class companies, delighting you and exceeding your expectations must always be our primary goal.

Enjoy! Most important, as you study finance, HAVE FUN!! We know that there will be times during the course where many of you will be convinced that finance is anything else *but* fun, but this doesn’t have to be so. We believe that one of the most important goals for every worker—whether a student, professor, finance professional, or anyone else—is to find what the renowned management thinker W. Edwards Deming called “joy in work.” If you put in the effort to read carefully, to do the assigned problems, to go over the sticky points, to review your work, and to discuss the material with your friends who are also taking the course, you will be rewarded handsomely with useful and important learning that will last a lifetime. And as it has for your professor and us, finance will become a true labor of love.

A B O U T T H E A U T H O R S

Frank M. Werner is Associate Professor of Finance at the Gabelli School of Business of Fordham University. He received his Ph.D. in Finance from Columbia University in 1978. He also received an M.Phil. in Finance from Columbia in 1975 and an M.B.A. from Harvard in 1968. His undergraduate degree, also from Harvard, was in Engineering and Applied Physics in 1966. Dr. Werner is the author of a variety of journal articles, a computer-based simulation of corporate finance decision making, and numerous monographs and cases for instructional use. He is a member of the American Finance Association, the American Society for Quality, Financial Executives International, the Financial Management Association, and the Academy of Business Education of which he is a former board member. In addition to his responsibilities at Fordham, Dr. Werner advises companies in the areas of corporate finance and quality management. He has given seminars on various quality and finance topics, in both English and Spanish, throughout North, Central, and South America; Europe; Asia; Africa; and the Middle East. His novel, *The Amazing Journey of Adam Smith* (CreateSpace, 2010), explores the connection between financial self-interest and the evolving needs of society, often referred to as 'global sustainability.'

James A.F. Stoner is Professor of Management Systems at the Gabelli School of Business of Fordham University. He received his Ph.D. from the MIT School of Industrial Management (now the Sloan School) in 1967. He also earned an S.M. in Management from MIT in 1961 and a B.S. in Engineering Science from Antioch College in 1959. Dr. Stoner is author and co-author of a number of books and journal articles. These include *Management*, sixth edition, Prentice Hall; *Introduction to Business*, Scott Foresman; and *World-class Managing—Two Pages at a Time*, Fordham University. He is a member of the Academy of Management where he is the founder and chair of the Management Spirituality and Religion interest group and past chair of the Management Education and Development Division; the American Society for Quality; the Academy of Business Education, and the Organizational Behavior Teaching Society, of which he is a former board member. In addition to his responsibilities at Fordham, Dr. Stoner advises several major companies on the movement toward quality management and teaches in executive seminars on quality and management. He has taught in executive programs in North and South America, Europe, Africa, and Asia. In 1992, Fordham University established the James A.F. Stoner Chair in Global Sustainability.

Drs. Werner and Stoner are the authors of five books studying changes in finance in companies that are leaders in quality management: *Remaking Corporate Finance—The New Corporate Finance Emerging in High-Quality Companies* (McGraw-Hill Primis, 1992), *Finance in the Quality Revolution—Adding Value by Integrating Financial and Total Quality Management*, (Financial Executives Research Foundation, 1993), *Managing Finance for Quality—Bottom-Line Results from Top-Level Commitment* (ASQ Quality Press and the Financial Executives Research Foundation, 1994), *Internal Audit and Innovation* (Financial Executives Research Foundation, 1995), and *Joining Forces* (Fordham Graduate School of Business monograph, 1998). They are also the authors of the textbook *Modern Financial Managing—Continuity and Change*.

C R E D I T S

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CHAPTER 10


THE COST OF CAPITAL

*M*adeline Ewing refilled her coffee cup and returned to the conference table. The director of financial analysis for her company was pointing to a flip-chart in the corner of the room. “I’ve put the Irving Fisher interest rate model up on this chart. Remember that all interest rates are composed of pure, inflation, and risk factors. It is important that we understand each component of the rates of return demanded by our investors if we are to come up with a meaningful number.”

As a new member of her company’s financial analysis staff, Madeline was part of the group responsible for bringing a finance perspective to the analysis of the firm’s investment decisions. Today, the group was meeting to update the calculation of the firm’s cost of capital.

The meeting had begun with a review of the current state of the financial markets presented by the chief economist of the firm’s bank. This led to a discussion of the level and structure of interest rates and forecasts of where rates might be in 3, 6, and 12 months. Now the group was talking about ways to measure investors’ perceptions of the riskiness of the firm’s securities.

Madeline raised her hand. “I’m still not sure how we should handle the fact that we raise money from a variety of sources—we’ve already talked about banks, long-term creditors, and stockholders, just for starters. I can’t believe that all of



them want the same rate of return from us. In fact, if the modeling we're doing is correct, they should want different rates of return. After all, they hold financial instruments that differ in maturity and risk. How do we put it all together?"

Madeline's question points out a fundamental financial dilemma all companies face. A proposed use of funds adds value to a firm if it generates benefits in excess of the requirements of the company's stakeholders. Yet, every firm has multiple stakeholders, and they each have their own requirements. Which stakeholders' requirements should be used to test whether a proposed use of money is acceptable? Fortunately, finance theory provides a practical solution to Madeline's concern, recommending that a firm first meet the needs of its noninvestor stakeholders and then test the remaining cash flows against the cost of capital, a single rate integrating the requirements of all financial investors.

The cost of a firm's capital, like the cost of the other resources it uses, is a significant determinant of its ability to be competitive. A company that can raise low-cost capital has an important edge over its competition. When its capital costs are low, a company can price aggressively and still be profitable. It can plow more funds into research and development and into other product and service improvements. And by generating high rates of return it can increase the benefits it provides to all of its stakeholders. Accordingly, a key part of the financial manager's responsibility is to minimize capital costs, a job that begins with a thorough understanding of where the firm's cost of capital comes from and how it is constructed.

Key Points You Should Learn from This Chapter

After reading this chapter you should be able to:

- Discuss the meaning of the cost of capital and how the establishment of a cost of capital affects management decision making.
- Describe the process of calculating a cost of capital.
- Determine an investor's required rate of return.
- Explain why the cost of a capital source may differ from the investor's required rate of return.
- Calculate the cost of financing with bonds, preferred stock, and common stock.
- Integrate the cost of a firm's capital sources to produce its cost of capital.
- Graph a firm's cost of capital schedule.

Introductory Concepts—The Nature of the Cost of Capital

cost of capital—the minimum rate of return a firm must earn on new investments to satisfy its creditors and stockholders

The **cost of capital** is an interest rate—the minimum interest rate a firm must earn on its investments to add value for its stakeholders. It is closely related to investors' required rates of return, a concept we explored in the last chapter, but it goes beyond the requirements of investors to include other costs of raising money that investors do not see.

1. The Cost of Capital Is an Incremental Cost

In economic terms, the cost of capital is a firm's opportunity cost.¹ Every time a company invests money, it makes a choice. By accepting one investment, it forgoes the opportunity to invest elsewhere. One "alternate investment" is for the company to return the funds to its investors and let them put the money into some other earning opportunity. Investors will demand this if the firm cannot do better than they can elsewhere. Accordingly, the firm must earn a rate of return above this opportunity cost to satisfy its investors.

The cost of capital concept is incremental in nature. Every new investment opportunity requires management either to raise new money or to reinvest money already within the firm, money that otherwise could be returned to investors. Either way, by making an investment, the firm is asking investors to forgo some other investment opportunity that could earn at today's level of interest rates. *The cost of capital is thus always calculated using the rates of return investors would require today to provide new funds to the firm.*



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¹ **Cross-reference:** The concept of an opportunity cost was introduced in Chapter 2, page 46.

2. The Effect of the Cost of Capital on the Organization

Establishing a cost of capital provides a powerful signal to members of an organization as to what is acceptable financial behavior. It states loudly and clearly that an investment idea that cannot better that benchmark will be rejected out of hand. Individuals hoping to get approval for their proposals will be motivated to spend time recasting their work into a form that can be tested against the cost of capital. Done properly, this can be a healthy discipline. Done poorly, it can lead to much destructive behavior.

If the cost of capital analysis is too tightly managed by the finance function, it can place too much authority in the hands of finance. This can lead finance to adopt a “judge and jury” role, making decisions about ideas on which it is often not well qualified to pass judgment. This also erects barriers between business departments and works against cooperative teamwork within the organization.

At the other extreme, if the cost of capital is not used under the guidance of those with financial expertise, it is in danger of being used incorrectly by those hoping to have their pet projects approved. Numbers will be twisted to look good and lose all their meaning in the process.

The cost of capital typically will differ among the various parts of the organization. Each unit of a company has its own risks, different from the other parts of the business. Accordingly, each unit has its own beta and requires its own risk premium. Further, the different parts of a business often provide access to individualized funds, sources of money not available to other units of the organization. To the extent a business unit can obtain low-cost funds, it lowers its cost of capital vis-à-vis the rest of the organization. The wise financial manager works closely with the various parts of the business to foster an understanding about the cost of capital so it is not used or seen as a tool of arbitrary discrimination.

Properly used, the cost of capital becomes a shared understanding of the financial requirements of the business—a guide helping everyone within the organization grasp what is needed for successful financial performance.

The Process of Calculating a Cost of Capital

The calculation of a cost of capital proceeds through five steps:

1. *Identify the sources of capital the firm will use.* Only these sources enter the cost of capital calculation; the firm has no obligation to people or organizations that are not its stakeholders. In Chapter 2 we saw that financial leverage ratios are often used to test the wisdom of the firm’s financing decisions. We will continue the analysis of financing choice in Chapter 14, where we examine the mix of debt and equity. In Chapter 15, we will study the mix of debt maturities. In this chapter we will assume that the firm has already made these decisions.
2. *For each source of financing the firm plans to use, determine the required rate of return demanded by the supplier(s) of those funds.* The cost of capital begins here

since its purpose is to test potential uses of funds to see if they produce the returns investors want. Where the investor is a professional, such as a banker or a private investor, we only need to ask. However, if we are raising funds from many investors in the public markets, it is impossible to learn investors' required rate of return by asking. First, it is difficult to phrase the question in a way that conveys precisely the correct meaning to each respondent. Second, it is unlikely that investors would give the desired answer; rather they might ask for a much higher rate of return in the hopes of motivating management to do better. Third, we would have to ask all potential investors. As a result, we use other means to estimate investors' required rate of return for publicly issued securities.

cost of a source of funds—the rate a firm must earn from the use of funds to provide the rate of return required by that investor

flotation costs—the total amount paid to third parties in order to raise funds

3. *Convert each required rate of return to the cost of that source of funds.* Since we plan to use the cost of capital to qualify the firm's potential investments, we need a number that captures all the benefits and obligations the firm will experience if it raises these funds. The cost of a source of capital is found by adjusting investors' required rate of return by the effects of flotation costs and income taxes. **Flotation costs**, the costs associated with issuing a security, add to the cost of capital by requiring a company to earn not only the investors' required rate of return, but also enough to cover these extra costs. By contrast, whenever the cash paid to investors is a legitimate deduction on a firm's tax return—interest payments, for example—the government effectively reduces the cost of that source of capital by reducing the firm's tax payments.
4. *Integrate the various capital costs into one overall cost of capital for the firm.* The typical company raises money from a variety of sources, each with its own cost. Yet we want to produce a single number that the firm can use to test the adequacy of the returns on investments it might undertake. We use the relative proportion of each financing source to produce a “weighted-average” cost of capital.
5. *Extrapolate the cost of capital into a cost of capital schedule, projecting how the cost of capital will change with the amount of financing the firm attempts to acquire.* In general, firms use the least-expensive financing sources first, and, when these run out, turn to more-expensive sources of money. As a result, a company that needs to raise large amounts of funding will find its cost of capital rising.²

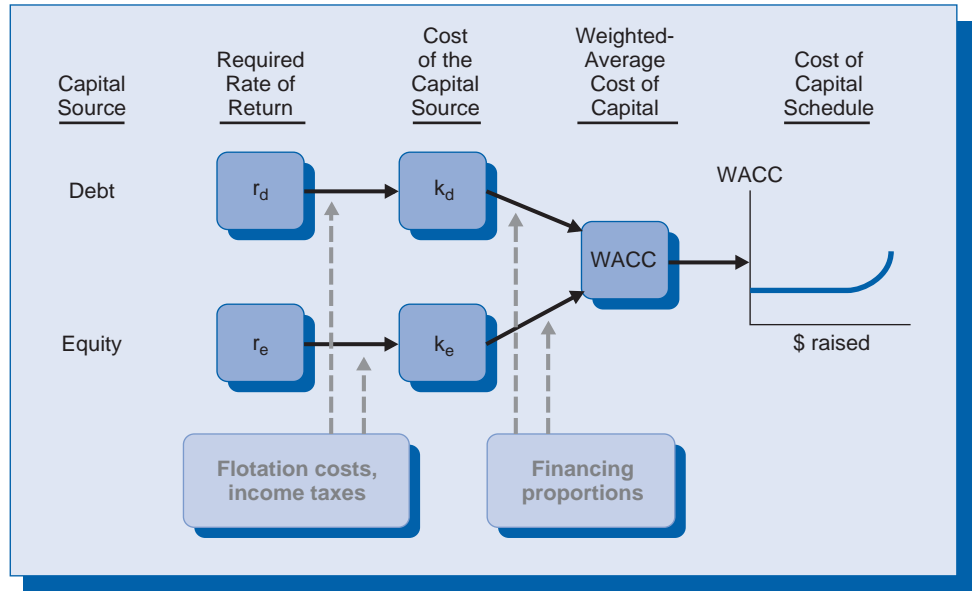
Figure 10.1 summarizes this process. In Figure 10.1, we introduce the notation used to represent these concepts. “*r*” stands for investors' required rate of return, and “*k*” stands for the cost of that source of capital. The subscripts are “*d*” for debt, and “*e*” for equity. As needed, we will introduce additional subscripts to denote more specific forms of debt and equity: “*b*” for bonds, “*ps*” for preferred stock, “*cs*” for common stock, and “*re*” for retained earnings. We represent the weighted-average cost of capital by its initials: “WACC.”

In the remainder of this chapter we will learn how to perform each of the five steps in turn.

² **Alternate point of view:** We have shown this pattern in Figure 10.1 in the graph of the cost of capital schedule by drawing a line that starts off horizontal and then curves up as capital costs increase. However, there is some evidence that as large firms raise an increasing amount of money, the cost of capital declines somewhat before it increases due to economies of scale in raising funds.

FIGURE 10.1

The process of calculating a cost of capital. Required rates of return first are converted into “costs” by incorporating flotation and income tax effects and then are combined by taking a weighted average.



Determining Required Rates of Return

Professional investors normally quote their required rate of return when asked. Sometimes the quotation is uncomplicated and gives the required rate of return directly.

Example

A Quotation That Directly Gives the Required Rate of Return

A loan officer at the First Finance Bank offers a \$10 million ordinary interest loan for one year at a fixed annual rate of 12%. 12% is r_{bnp} , the bank's required rate of return on these “bank notes payable.”

More often, the quotation contains sufficient complexity to require further analysis.

Example

A Quotation That Does Not Directly Give the Required Rate of Return

A loan officer at the Second Finance Bank offers a \$10 million ordinary interest loan for one year at a fixed annual rate of 10% plus a 2% origination fee and a 15% compensating balance requirement.³

Question: Is r_{bnp} , the bank's required rate of return, equal to 10%?

Answer: r_{bnp} , the bank's required rate of return on this loan, is not simply the 10% rate quoted by the bank since the fee and balance requirement complicate the loan's cash flows. We must solve for the interest rate embedded in this quotation.

³ **Elaboration and cross-reference:** A loan origination fee is paid to the lender at the time the loan is taken. A compensating balance is a noninterest-bearing deposit that must be kept at the bank as long as the loan remains outstanding.

If we are not dealing with a professional investor, we must use other means to calculate investors' required rate of return. One way is to infer their required rate from their behavior, in particular from the price they set on the firm's securities. As we saw in Chapter 9, investors use their required rate of return as the discount rate to set security prices. By doing the calculation in reverse we can use the price we observe to derive the required rate of return.

Example**Inferring the Required Rate of Return from Security Prices**

Investors have set a price of \$950 on the \$1,000 face value bonds of the Juliet Company. The bonds have an 9.00% annual coupon and mature in seven years.

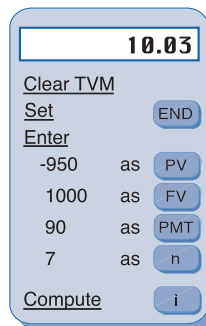
Question: What is r_b , the rate of return required by bond investors?

Solution steps:

1. Identify the cash flows promised by this bond. With an 9.00% coupon, the bond pays 9.00% of \$1,000 = \$90 per year, for 7 years. It will also pay its maturity value 7 years from now.

	Year 0	Years 1–7	Year 7
Price/par	(\$950)		\$1,000
Interest		\$90	

2. Calculate the interest rate embedded in these cash flows:



Answer: Investors' required rate of return from these bonds, r_b , is their yield to maturity of 10.03%.

The required rate of return on common stock traded in the capital markets may also be estimated as the risk-free rate of interest plus an appropriate risk premium by using the capital asset pricing model presented in Chapter 8.

Example**Deriving the Required Rate of Return on Common Stock from the Capital Asset Pricing Model**

The common stock of the Jordan Company has a beta of 1.25. U.S. Treasury bonds currently yield 6.50%, and the market price of portfolio risk is estimated to be 7.3%.

Question: What is r_{CS} , the required rate of return of investors in this stock?

Solution steps: Apply the capital asset pricing model:

$$\begin{aligned} r_{cs} &= r_f + (\text{market price of portfolio risk}) \times \beta \\ &= 6.50\% + (7.3\%) \times 1.25 \\ &= 6.50\% + 9.13\% = 15.63\% \end{aligned}$$

Answer: Investors require an 15.63% rate of return from Jordan Company stock.

Calculating the Cost of a Capital Source

The cost of a source of financing, like investors' required rate of return, is an interest rate. And, like the required rate of return, it is typically found by organizing the cash flows associated with the financing and solving for the embedded rate of interest. It differs from the required rate of return in that it is more inclusive. While the required rate of return calculation looks only at the cash flows between the investor and the firm, the cost-of-a-capital-source calculation adds in the other cash flows the firm experiences as a result of taking the financing. Thus, while the required rate of return describes the *cash flows experienced by the investor*, the cost of a capital source describes the *cash flows experienced by the firm*.

There are two cash flows that arise from taking on financing which are experienced by the firm but not by investors: flotation costs and corporate income taxes.

1. Flotation Costs

Flotation costs include all amounts paid to third parties to arrange the issue of securities: underwriting fees, selling fees, legal fees, printing costs, filing fees, etc. Some sources of financing—bank loans, for example—can be obtained without flotation costs. Others—for example, the public sale of bonds or stock—typically require investment banking and legal assistance. If flotation costs must be paid, the cost of that source of funds will be greater than investors' required rate of return.

NET Present Value
Goldman Sachs at www.goldmansachs.com is an investment bank providing assistance to businesses in raising funds

Examples

How Flotation Costs Raise the Cost of a Capital Source

Juliet Company's investment banker has advised the firm that in today's market it would be possible to sell at face value a new issue of \$100 preferred stock with a \$13 annual dividend, and they would charge 6% of face value to underwrite the issue.

Question: What is r_{ps} , the required rate of return of investors willing to purchase this new preferred stock issue?

Solution steps: Solve for the interest rate *investors* will experience if they buy this preferred stock. (Recall that preferred stock is a perpetuity.)

1. Organize the investors' cash flows:

	Year 0	Years 1–∞
Buy stock at face value	(\$100)	
Receive dividend		\$13
Net cash flows	(\$100)	\$13

2. Solve for the interest rate using the model for the present value of a perpetuity:

$$\text{Rate} = \frac{D_{ps}}{\text{price}} = \frac{\$13}{\$100} = 13.00\%$$

Answer: Investors require a 13.00% rate of return to invest in Juliet Company's proposed preferred stock issue.

Question: What is k_{ps} , the cost to Juliet Company of this preferred stock?

Solution steps: Solve for the interest rate *the firm* will experience if it issues this preferred stock.

1. Organize the firm's cash flows *including flotation cost* (6% of the planned \$100 face value = \$6 per share):

	Year 0	Years 1–∞
Sell stock at face value	\$100	
Pay dividend		(\$13)
Pay flotation cost	(\$6)	
Net cash flows	\$ 94	(\$13)

2. Solve for the interest rate using the model for the present value of a perpetuity:

$$\text{Cost} = \frac{D_{ps}}{\text{net proceeds}} = \frac{\$13}{\$94} = 13.83\%$$

Answer: The cost, k_{ps} , to Juliet Company of this new preferred stock capital is 13.83%. This is greater than investors' required rate of return of 13.00%. If Juliet Company issues the preferred stock, it will have to earn 13.83% from investing the proceeds both to pay the flotation cost and to return 13.00% to its investors.⁴

2. Corporate Income Taxes

The tax law of each country determines which expenses are deductible for tax purposes and which are not. In most countries, including the United States, deductible expenses include interest expense but do not include principal amounts on loans or dividends, both of which are paid after taxes. A financing source that permits additional tax deductions lowers the firm's taxable income, reducing the taxes it must pay. The firm can use this "released" money for partial payment of its obligation to the investors—in effect the government provides a subsidy to the firm. As a result, a financing source that permits a company to increase its tax deductions will have a cost less than investors' required rate of return.

⁴ **Elaboration:** Another way to look at the effect of flotation costs is to notice that, while each investor pays \$100 for a share of the new preferred, Maggileo Company only receives \$94. With less than the full amount to invest, each dollar has to earn at a higher rate of return to bring in the required \$13 annual dividend.

Examples

How the Corporate Income Tax Lowers the Cost of a Capital Source

Juliet Company can privately place an issue of \$1,000 face value, 30-year bonds. The bonds would carry a 8.75% interest coupon paid annually and would be purchased by the investor at par. Since the issue would be privately placed, there would be no flotation cost. Juliet is in the 35% marginal income tax bracket.

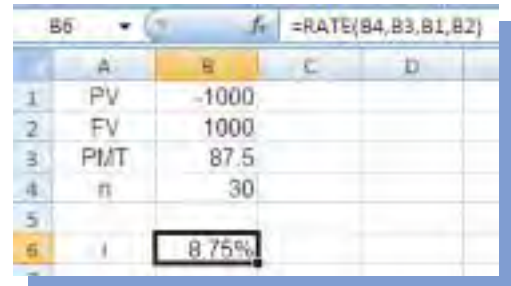
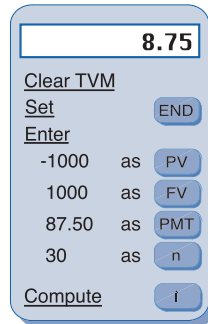
Question: What is r_b , the required rate of return of the investor willing to purchase this new bond issue?

Solution steps: Solve for the interest rate *investors* will experience if they buy this bond issue.

1. Identify the cash flows promised by this bond. With an 8.75% coupon, the bond pays 8.75% of \$1,000 = \$87.50 per year for 30 years. It will also pay its maturity value 30 years from now. The price is par value or \$1,000 per bond.

	Year 0	Years 1–30	Year 30
Lend / get back principal	(\$1,000)		\$1,000
Receive interest		\$87.50	

2. Calculate the interest rate embedded in these cash flows:



Answer: The investor requires an 8.75% rate of return to buy Juliet Company's proposed bond issue.

Question: What is k_b , the cost to Juliet Company of this bond financing?

Solution steps: Solve for the interest rate *the firm* will experience if it issues these bonds.

1. Calculate the tax savings from deducting interest payments:

$$\text{Tax savings} = 35\% \times \$87.50 = \$30.63.$$

2. Organize the firm's cash flows *including the tax savings*:

	Year 0	Years 1–30	Year 30
Receive / repay principal	\$1,000		(\$1,000)
Pay interest		(\$87.50)	
Tax savings		30.63	
Net cash flows	\$1,000	(\$56.87)	(\$1,000)

3. Calculate the interest rate embedded in these cash flows:

5.69

Clear TVM

Set END

Enter

1000 as PV

-56.87 as PMT

-1000 as FV

30 as n

Compute i

	A	B	C	D
1	PV	1000		
2	PMT	-56.87		
3	FV	-1000		
4	n	30		
5				
6	i	5.69%		

Answer: The cost, k_b , to Juliet Company of this new bond capital is 5.69%. This is less than investors' required rate of return of 8.75%. If Juliet Company issues the bonds, it will only have to earn 5.69% from investing the proceeds to be able to return 8.75% to its investor. The remainder of the 8.75% return will come from the cash redirected from tax payments to the investor.⁵

Figure 10.2 identifies in summary form how long-term financing sources are affected by flotation costs and income taxes. In general, if a security is sold to the public the firm will incur flotation costs. Income taxes will be reduced for debt financing since interest payments (but not dividends) are tax-deductible. Notice that all four combinations are possible: a financing source can result in both flotation costs and tax reductions (publicly placed debt), flotation costs but no tax reductions (publicly placed preferred and common stock), tax reductions but no flotation costs (privately placed debt), or neither flotation costs nor tax reductions (retained earnings and privately placed preferred and common stock).

The Cost of Various Capital Sources

Every prospective entry on the right-hand side of a firm's balance sheet represents a possible source of financing. While they differ in many respects—different investors, different maturities, different degrees of flexibility, different claims, different risk exposures, etc.—each financial source used by the firm makes up one piece of its overall cost of capital. Financial managers must evaluate each of these funding sources and determine first the required rate of return, and then the cost of each. Nevertheless, the primary funding sources for many companies are the long term sources: bonds, preferred stock and common stock. As a result, we consider these three sources in the remainder of this chapter.

Since the calculation of the cost of a funding source is an extension of the calculation of the required rate of return (adding in the cash flows for flotation costs and corporate income taxes), we illustrate these two steps in combination in the examples of this section. In each case we will follow a two-step process:

⁵ **Elaboration:** A simplified method to calculate the (after-tax) cost of financing when payments to the investor are tax-deductible is to multiply the (pre-tax) required rate of return by $(1 - \text{the tax rate})$. In this case:

$$k_b = r_b \times (1 - .35) = 8.75\% \times (.65) = \underline{5.69\%}$$

Financing source		Flotation cost	Reduced corporate income tax
Long-term debt (bonds)	Private placement		X
	Public issue	X	X
Preferred stock	Private placement		
	Public issue	X	
Common equity	Retained earnings		
	Private placement		
	Public issue	X	

FIGURE 10.2

Summary of additional cash flows. Public issues incur flotation costs while interest on debt reduces corporate income taxes.

NET Present Value

Weighted average cost of capital calculations for stocks traded on the New York, American, and NASDAQ exchanges are available at thatswacc.com

1. Calculate investors' required rate of return by studying the market price and the cash flows anticipated by investors in an existing security of comparable risk and maturity to the proposed new issue.
2. Calculate the cost of the funding source by laying out the cash flows the firm would experience if it were to issue new securities to give investors the required rate of return determined in step 1.

1. Bonds

Bonds have an explicit cost due to their interest obligation, however, the interest is tax-deductible which lowers the cost of bond financing. If sold to the general public, a new issue will most likely have flotation costs as well. The tax treatment of flotation costs depends on the tax law; in the U.S., flotation costs on debt instruments must be capitalized and amortized over the life of the issue.⁶ Thus, there is a second small tax subsidy for debt with flotation costs.

Examples**The Cost of Bonds**

Jordan Company has \$100,000 of outstanding bonds consisting of 100 \$1,000 face value bonds with a 12.00% annual coupon. The issue will mature in 20 years and is currently selling for 102.5 (\$1,025 per bond). Jordan's investment banker has advised that it would require a 4% underwriting fee to place a new 20-year issue of comparable risk. Jordan is in the 35% marginal tax bracket.

Question: What is r_b , the required rate of return of Jordan's bond investors?

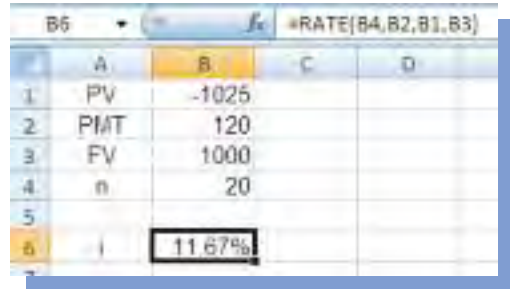
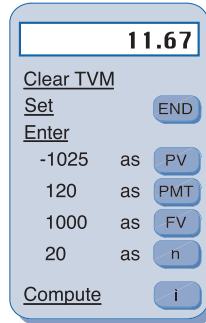
Solution steps: Use the outstanding bond to calculate investors' required rate of return by solving for the interest rate *the investors* will experience if they buy the bond today:

1. Identify the cash flows of this bond. It will cost \$1,025. With a 12.00% coupon, the bond will pay 12.00% of \$1,000 = \$120 per year for 20 years. It will also pay its face value 20 years from now.

	Year 0	Years 1–20	Year 20
Pay price / get back principal	(\$1,025)		\$1,000
Receive interest		\$120	

⁶ **Accounting review:** This means flotation cost must be treated just like a machine subject to straight line depreciation with a zero salvage value. The company cannot deduct the flotation cost when the bond is issued but must spread it out evenly, deducting a small amount each year.

2. Calculate the interest rate embedded in these cash flows:



Answer: Investors require an 11.67% rate of return, r_b , from Jordan’s existing bonds.

Question: What is k_b , the cost to Jordan of a new issue of bond financing if the interest coupon on the new bonds is set so they will sell at par value?

Solution steps: Solve for the interest rate *the firm* will experience on the proposed new issue:

- Since investors now require a yield of 11.67%, a new issue would have to carry a coupon of $11.67\% \times \$1,000 = \116.70 per year to sell at par.
- Calculate flotation costs and tax savings:

Flotation cost = $4\% \times \$1,000 = \40 per bond

Tax saving from deducting interest each year
 = $35\% \times \$116.70 = \40.85

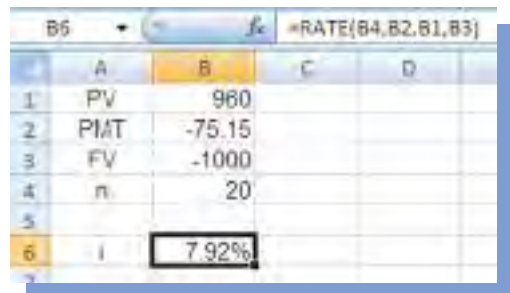
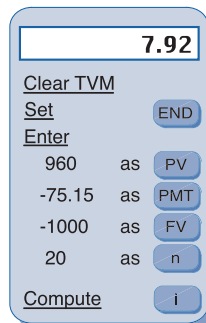
Tax saving from deducting flotation cost:
 Amount deducted each year
 = $\$40 / 20 \text{ years} = \2 .

Tax saving each year = $35\% \times \$2 = \0.70

3. Include flotation costs and income taxes in the cash flows:

	Year 0	Years 1–20	Year 20
Receive / repay principal	\$1,000		(\$1,000)
Pay interest		(\$116.70)	
Pay flotation cost	(40)		
Tax savings-interest		40.85	
Tax savings-flotation		.70	
Net cash flows	\$ 960	(\$ 75.15)	(\$1,000)

4. Calculate the interest rate embedded in these cash flows:



Answer: The cost of this financing, k_b , is 7.92%. Jordan must invest the money to earn at least 7.92%.

2. Preferred Stock

Because preferred stock pays a dividend and not interest, payments to investors are not tax deductible. In addition, under United States tax law flotation costs on a stock issue may not be deducted on the firm's tax return. As a result, in the U.S. preferred stock receives no tax subsidy at all.

Examples

The Cost of Preferred Stock

Jordan Company has \$25,000 of outstanding preferred stock, consisting of 250 shares, each with \$100 face value and currently selling for \$87.50. The stock pays an annual dividend of \$11.00 per share. Jordan's investment banker has advised that it would charge a 6% underwriting fee to place a new issue of comparable risk.

Question: What is r_{ps} , the required rate of return of Jordan's preferred stock investors today?

Solution steps: Use the outstanding preferred stock to calculate investors' required rate of return by solving for the rate *the investors* will experience:

1. Organize the investors' cash flows:

	Year 0	Years 1–∞
Buy stock	(\$87.50)	
Receive dividend		\$11.00

2. Apply the model for the present value of a perpetuity:

$$\text{Rate} = \frac{D_{ps}}{\text{price}} = \frac{\$11.00}{\$87.50} = 12.57\%$$

Answer: Investors require a 12.57% rate of return, r_{ps} , from Jordan's existing preferred stock.

Question: What is k_{ps} , the cost to Jordan of a new issue of preferred stock financing if the dividend on the new stock is set so it will sell at par value?

Solution steps: Solve for the rate *the firm* will experience on the proposed new issue:

1. As investors now require a 12.57% yield from Jordan Company preferred stock, a new issue would have to carry a dividend of $12.57\% \times \$100.00 = \12.57 to sell at par.
2. Calculate flotation costs:

$$6\% \times \$100.00 = \$6.00 \text{ per share}$$

3. Include flotation costs in the cash flows:

	Year 0	Years 1–∞
Sell stock	\$100.00	
Pay dividend		(\$12.57)
Pay flotation cost	(6.00)	
Net cash flows	\$ 94.00	(\$12.57)

4. Solve for the interest rate using the model for the present value of a perpetuity:

$$\text{Cost} = \frac{D_{ps}}{\text{net proceeds}} = \frac{\$12.57}{\$94.00} = 13.37\%$$

Answer: The cost, k_{ps} , to Jordan Company of this new preferred stock capital is 13.37%. Jordan must earn at least 13.37% on the money to justify its preferred stock financing.

3. Common Equity

A company that wishes to increase its common equity financing can do so in either of two ways. First, it can simply retain earnings. The earnings of a firm represent the residual increase in value not claimed by other stakeholders. By electing not to pay this as a dividend, management forces shareholders to increase the amount they have invested in the firm. Alternatively, management may choose to sell new shares of stock. These may be sold to existing shareholders or, more usually, to new investors.

Regardless of the source of new equity, the required rate of return is the same. Investors see no difference between the money they paid in and the money that management (re)invested for them. As a result, there is only one required rate of return for both retained earnings and for a new common stock issue. In addition, common stock financing, like preferred-stock financing, gets no tax subsidy, since neither its dividends nor flotation costs may be deducted on the firm's tax return.

However, there is a difference in the cost of these two common equity sources due to flotation costs. Notice that there are no flotation costs associated with retained earnings—a firm does not have to pay third parties to keep what it already has. By contrast, it is normal to use the services of an investment banker to sell a new stock issue. As a result, *the difference in flotation costs is the only distinction between the cost of retained earnings and the cost of a new common stock issue.*

Examples

The Cost of Common Equity

Jordan Company has 10,000 shares of common stock outstanding currently selling for \$25.00 per share. The stock recently paid a \$1.70 per share dividend, and investors forecast that the firm will grow at an 8% annual rate for the foreseeable future. Jordan expects to retain \$20,000.00 in the coming year. Should it require additional equity financing, it will sell shares of stock to the public; its investment banker has advised that it would require a 7% underwriting fee to place any new issue.

Question: What is r_{cs} , the required rate of return of Jordan's common stock investors today?

Solution steps: Use the outstanding common stock to calculate investors' required rate of return by solving for the rate *the investors* will experience:

1. Forecast the next dividend by incorporating the 8% growth rate:

$$D_1 = \$1.70 (1.08) = \$1.836$$

2. Apply the dividend-growth model:

$$\text{Rate} = \frac{D_1}{\text{Price}} + g = \frac{\$1.836}{\$25.00} + .08 = .0734 + .08 = .1534 = 15.34\%$$

Answer: Investors require a 15.34% rate of return, r_{CS} , from Jordan's existing common stock.

Question: What is k_{re} , the cost to Jordan of retaining additional earnings?

Answer: $k_{re} = r_{CS} = \underline{15.34\%}$. With no flotation cost nor tax subsidy, *the cost of retained earnings always equals investors' required rate of return.*

Question: What is k_{CS} , the cost to Jordan of a new issue of common stock?

Solution steps: Solve for the rate *the firm* will experience on the proposed new issue:

1. Calculate the net proceeds to Jordan of a new stock issue.

$$\text{Flotation cost} = 7\% \times \$25.00 = \$1.75 \text{ per share.}$$

$$\text{Net proceeds} = \$25.00 - 1.75 = \$23.25 \text{ per share.}$$

2. Apply the dividend-growth model:

$$\text{Rate} = \frac{D_1}{\text{net proceeds}} + g = \frac{\$1.836}{\$23.25} + .08 = .0790 + .08 = .1590 = 15.90\%$$

Answer: The cost, k_{CS} , to Jordan of a new stock issue is 15.90%. Jordan must earn a return on these funds of at least this amount to satisfy its common stockholders.

The required rate of return and cost of common stock we calculated using the dividend-growth model are necessarily rough estimates. Unlike bonds and preferred stock, which specify their future cash flows, common stock does not. While we see the market price investors set on common stock, we can only guess at the future cash flows they forecasted and used to calculate that price. If we guess correctly, our estimates of the required rate of return and cost of common stock will be good; if we guess incorrectly we could be far off the mark.

Because it is difficult to obtain a precise figure for the cost of common equity, two other approaches are commonly used to confirm the accuracy of our calculations, (1) the capital asset pricing model, and (2) the "bond-yield-plus" model.

Capital asset pricing model Earlier in this chapter we used the capital asset pricing model to estimate investors' required rate of return on Jordan Company stock. The number we obtained there, 15.63% is sufficiently close to our number above, 15.34% to give us some comfort.

Bond-yield-plus model Another device for estimating the required rate of return on common stock is to calculate the required rate for a company's bonds and add a further risk premium. Common stock should be a riskier investment than bonds and should therefore yield a higher rate of return. From historical evidence, the appropriate incremental risk premium for many companies seems to be in the

neighborhood of 4%. Applying this logic to the required rate of return we calculated for Jordan Company's bonds:

$$r_{cs} = r_b + \text{about } 4\% = 11.67\% + \text{about } 4\% = \underline{\text{about } 15.67\%}$$

This technique produces a number that is similar to the other two, further increasing our comfort level. It is likely that the required rate of return on Jordan's common stock is somewhere in the 15–16% range.

Calculating the Overall Cost of Capital

Jordan Company raises capital from various sources. If the funds could be kept in separate bundles—so that the money raised from bondholders was never mixed with the money raised from bankers or with the money raised from stockholders, etc.—then Jordan could use the cost of each funding source as the minimum rate of return it must earn using that money. For example, money with a 10% cost would be invested to earn more than 10%, while money with a 14% cost would have to earn more than 14%. However, the funds raised from various sources quickly get mixed together within a business; it is nearly impossible to look at any one dollar and identify its source. In addition, firms often undertake costly investment projects which require funding from more than one source. As a result, it is appropriate for Jordan to calculate and use a single number for its cost of capital.

Jordan's overall cost of capital resources will be a composite of the cost of each capital source. To calculate this number we take a weighted average of the cost of each source of funding used by the firm. The resulting number is commonly known as the **weighted-average cost of capital (WACC)**, reflecting its method of construction. It is also known as the **marginal cost of capital (MCC)** to emphasize its use as a marginal cost; that is, it measures the cost to the firm of raising its next dollar of capital where that dollar is composed of funding from various sources.

The weights used in calculating the WACC should be taken from the firm's **target capital structure**, management's plan for raising funding in the future. Recall that the WACC is intended to be an incremental figure, the cost of raising the *next* dollar of financing. We took care in calculating the cost of each capital source to look at today's requirements of investors. We must take equal care to ensure that our calculation combines these funds in a mix that reflects management's most up-to-date plans.⁷

weighted-average cost of capital (WACC)—a synonym for “cost of capital” emphasizing the method by which it is constructed

marginal cost of capital (MCC)—a synonym for “cost of capital” emphasizing its use as a measure of the marginal cost of capital funds

target capital structure—the percentage mix of financing sources management plans to use in the future

Example

Calculating the WACC

Jordan Company's management has announced a target capital structure consisting of 40% bond financing, 10% preferred stock financing, and 50% common equity financing.

⁷ **Elaboration:** Sometimes an analyst outside the firm does not know management's target capital structure yet must still approximate the firm's cost of capital. In this case it is usual to assume that the firm is currently at its target capital structure and take the weights from the mix of funds on the firm's most recent balance sheet. When doing this, analysts typically use the market value of each balance sheet item rather than its book value in order to reflect current market conditions and to avoid the incompatibilities of the financial accounting system.

Question: What is Jordan's WACC?

Solution steps: Construct a spreadsheet of funding costs⁸ and proportions (the target capital structure) and calculate the weighted average:

Funding Source	Cost	Proportion	Cost × Proportion
Bonds	7.92	40%	3.168
Preferred stock	13.37	10	1.337
Common equity	15.34	50	7.670
		100%	12.175% ≈ 12.18%

Answer: Jordan has a WACC of 12.18%. If each of Jordan's investments earn this amount or more, the proceeds will be sufficient to give all investors their required rate of return.

Producing the Marginal Cost of Capital Schedule

Notice that the cost figure used for common equity in Jordan Company's WACC calculation (above) was 15.34%, the cost of retained earnings. Jordan faced a choice of using retained earnings or issuing new stock, costing 15.90%, to increase its equity financing. By selecting retained earnings first, Jordan's financial manager chose the cheaper source of funding. It will always be to a firm's advantage, other things equal, to select the cheapest financing alternatives first. The firm should turn to more expensive capital only after the cheaper sources of financing are exhausted.

If a firm attempts to raise a large amount of capital at any one time, it will eventually exhaust its cheaper sources of financing. As it substitutes more expensive capital for the cheaper funds, its cost of capital will rise. The summary picture of this process is the **cost of capital schedule**, a graph showing the firm's cost of capital as a function of the amount of new financing that it raises. Item by item, each component of the cost of capital will have to be replaced by a more expensive source; its cost will go up, and the weighted average will go up as well. Each time this happens, we have reached a **break point** in the cost of capital schedule.

To locate the break points in a firm's cost of capital schedule, we need two pieces of information: how much of the cheaper source of financing can be raised before it runs out, and what proportion of the total financing mix comes from that source. If management sticks to its target capital structure, the amount of financing newly raised from every source always equals its proportion of the total new financing. The following equation restates this point:

$$\text{Amount of money from each source} = \text{its proportion} \times \text{total new financing}$$

Rearranging gives the form we use to calculate the break points:

$$\text{Total new financing} = \frac{\text{amount of money from each source}}{\text{its proportion}}$$

⁸ **Cross-reference:** Jordan's funding costs are carried forward from the previous examples in this chapter: bonds on pages 249–251, preferred stock on pages 251–252, and common equity on pages 252–253.

cost of capital schedule—a graph showing how a firm's cost of capital will increase with the amount of capital it attempts to raise

break point—a point on the cost of capital schedule where the firm's cost of capital increases

Example**Finding a Break Point in the Cost of Capital Schedule**

Jordan Company forecasts it will retain \$2 million of new earnings in the coming year. Common equity is 50% of the target capital structure.

Question: How much total financing can Jordan raise before it will have used up its new retained earnings and will have to turn to the more expensive new stock issue?

Solution steps:

$$\begin{aligned} \text{Total new financing} &= \frac{\text{amount from this source}}{\text{its proportion}} \\ &= \frac{\$2,000,000}{.50} = \$4,000,000 \end{aligned}$$

Answer: Jordan can raise a total of \$4 million of new financing (of which 50% will be the \$2 million of new retained earnings and the other 50% will be a mix of the remaining financing sources) before it will exhaust its supply of retained earnings.

After the break point we recalculate the WACC, substituting the higher-priced new stock issue for the cheaper retained earnings.

Example**Recalculating the WACC After the Retained Earnings Break Point**

If Jordan Company raises more than \$4 million of total new capital it will have to substitute newly issued stock with cost of 15.90% for retained earnings which cost 15.34%.

Question: What is Jordan's WACC after the break point?

Solution steps: Redo the spreadsheet making the substitution on the "common equity" line:

Funding Source	Cost	Proportion	Cost × Proportion
Bonds	7.92	40%	3.168
Preferred stock	13.37	10	1.337
Common equity	15.90	<u>50</u>	<u>7.950</u>
		100%	12.455% ≈ 12.46%

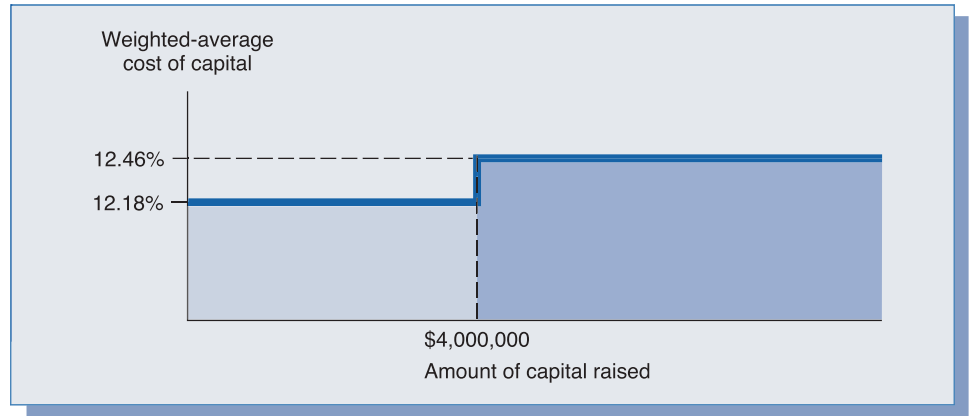
Answer: Jordan WACC goes up from 12.18% to 12.46%.

Figure 10.3 is the cost of capital schedule for the Jordan Company as far as we have gone in this chapter. We have found two costs of capital separated by one break point. However, it is likely that there will be additional break points on the cost of capital schedule as Jordan studies its other sources of financing to predict when they will run out and have to be replaced with more expensive sources.

*M*adeline Ewing listened intently to her peers as the meeting continued. After her earlier questioning, the group had begun an animated discussion of integrating the various components of the firm's cost of capital. By this point, Madeline felt she had a good grasp of how to construct that number.

FIGURE 10.3

Cost of capital schedule for the Jordan Company. The first \$4 million of new funds would have a cost of capital of 12.18%; additional funds would cost 12.46%.



The cost of capital was a combination of the rates of return required by all the company's financial investors. It was obtained by calculating a weighted average of the cost of each financial source, using the proportion of each source in the firm's financing mix as the "weights." The costs were derived by adding flotation costs and income tax reductions (if any) to each investor group's required rate of return.

As the meeting wound to a close, Madeline began to wonder some more about the needs of the nonfinancial stakeholders: the firm's employees and customers for example. Might it be possible to include their requirements into some kind of expanded cost of capital calculation, perhaps transforming it into a "cost of all resources" analysis? If so, what would such an analysis look like? And how might it be used? Madeline smiled as she realized she was asking important questions about the future of finance theory.

Summary of Key Points

- **Discuss the meaning of the cost of capital and how the establishment of a cost of capital affects management decision making.** The cost of capital is the minimum rate of return a firm must earn on its new investments to meet the financial requirements of its investors. It is the firm's opportunity cost, capturing the requirement that the firm must earn more than investors' alternate opportunities. The cost of capital is an incremental concept measuring the cost of raising the next dollar of funds. As such it is always calculated with the most current information about investor needs and market conditions. Because the cost of capital can be an important determinant of what activities are supported within the firm, it must be used wisely in a collaborative team-oriented manner.
- **Describe the process of calculating a cost of capital.** We construct the cost of capital for a firm in five steps: (1) select financing sources, (2) determine investors' required rates of return, (3) incorporate flotation costs and income taxes into the analysis to fully describe the firm's experience, (4) combine the various capital sources by taking a weighted average, and (5) project how the cost of capital will increase if the firm attempts to raise large amounts of money. The final output of the process is the cost of capital schedule, a graph projecting the firm's cost of capital as a function of its fund-raising plans.
- **Determine an investor's required rate of return.** Required rates of return can be obtained from professional investors by asking. When investors cannot give a meaningful quote, we infer required rates from market data. This is commonly done using cash-flow-based models and statistical risk models.
- **Explain why the cost of a capital source may differ from the investor's required rate of return.** The cost of a capital source includes the effects of flotation costs and income tax flows associated with the financing. Flotation costs raise the cost of financing above investors' required rate of return while the corporate income tax lowers the cost of debt financing.
- **Calculate the cost of financing with bonds, preferred stock, and common stock.** The cost of a fi-

ancing source is calculated by organizing the cash flows the firm will experience due to the financing, including any flotation costs and income tax savings. The cost of the capital source is the interest rate embedded within those cash flows.

■ **Integrate the cost of a firm's capital sources to produce its cost of capital.** When the cost of each capital source has been determined, they are combined into a weighted-average cost of capital, using the firm's target capital structure as the weights.

■ **Graph a firm's cost of capital schedule.** The cost of capital schedule shows how a firm's capital costs will rise as it raises more and more money. Each time a firm exhausts a capital source, it must turn to more expensive financing. This causes a break in the cost of capital schedule, and the firm's WACC rises. There is one break for every increase in capital costs.

Questions

1. In what sense is the cost of capital an opportunity cost? An opportunity cost to whom?
2. Distinguish between an investor's required rate of return and the cost of that source of funding.
3. Why does flotation cost raise the cost of capital while the federal income tax lowers capital costs?
4. Why are estimates of the cost of capital more accurate for bond financing than for common stock financing?
5. Is it possible that there could be sources of financing that have a zero cost?
6. For what funding sources:
 - a. are flotation costs applicable?
 - b. are flotation costs never applicable?
 - c. is the federal income tax subsidy applicable?
 - d. is the federal income tax subsidy never applicable?
7. What is the difference between the cost of retained earnings and the cost of financing through the sale of common stock?
8. What weights should be used in calculating the weighted-average cost of capital?
9. What is meant by a *break point* in the cost of capital schedule? What causes a break point to happen?
10. Why do we often draw the cost of capital schedule as upward sloping? Under what circumstances might it be downward sloping?

Problems

1. **(Bonds)** A company has an outstanding issue of \$1,000 face value bonds with a 9.5% annual coupon and 20 years remaining until maturity. The bonds are currently selling at a price of 90 (90% of face value).

An investment bank has advised that a new 20-year issue could be sold for a flotation cost of 5% of face value. The company is in the 35% tax bracket.

- a. Calculate investors' required rate of return today.
 - b. What annual coupon would have to be placed on the new issue in order for it to sell at par?
 - c. Calculate the flotation cost and tax savings from the proposed new issue.
 - d. Calculate the cost of the new bond financing.
2. **(Bonds)** A company has an outstanding issue of \$1,000 face value bonds with a 8.75% annual coupon and 10 years remaining until maturity. The bonds are currently selling at a price of 82.50 (82.50% of face value). The company wishes to sell a new bond issue with a 30-year maturity. Their investment bank has advised that (1) the new 30-year issue could be sold for a flotation cost of 3% of face value, and (2) current yield curves indicate that 30-year maturity bonds yield a nominal 75 basis points (0.75%) more than 10-year maturity bonds on average. The company is in the 35% tax bracket.
 - a. Calculate investors' required rate of return today.
 - b. What annual coupon would have to be placed on the new issue in order for it to sell at par?
 - c. Calculate the flotation cost and tax savings from the proposed new issue.
 - d. Calculate the cost of the new bond financing.
 3. **(Preferred stock)** A company has an outstanding issue of \$100 face value fixed-rate preferred stock with an annual dividend of \$10 per share. The stock is currently selling at \$75 per share. An investment bank has advised that a new preferred-stock issue could be sold for a flotation cost of 8% of face value. The company is in the 35% tax bracket.
 - a. Calculate investors' required rate of return today.
 - b. What annual dividend rate would have to be placed on the new issue for it to sell at par?
 - c. Calculate the flotation cost and tax savings from the proposed new issue.
 - d. Calculate the cost of the new preferred-stock financing.
 4. **(Preferred stock)** A company has an outstanding issue of \$100 face value fixed-rate preferred stock with an annual dividend of \$18 per share. The stock is currently selling at \$110 per share. An investment bank has advised that a new preferred-stock issue could be sold for a flotation cost of 6% of face value. The company is in the 35% tax bracket.
 - a. Calculate investors' required rate of return today.
 - b. What annual dividend rate would have to be placed on the new issue for it to sell at par?
 - c. Calculate the flotation cost and tax savings from the proposed new issue.
 - d. Calculate the cost of the new preferred-stock financing.

5. **(Common equity—dividend-growth model)** Today, you looked at *The Wall Street Journal* and a stock prospectus to read about a company whose stock you follow. You discovered the following:

Closing stock price:	\$14.00 per share
Earnings announcement:	\$3.00 per share
Earnings five years ago:	\$2.00 per share
Dividend payout ratio:	40.0% of earnings
Flotation cost for a new stock issue:	7.5% of market price

Based on the above data:

- Calculate the company's annual growth rate of earnings for the past five years.
 - Calculate the anticipated dividend one year from now, assuming no change in growth rate.
 - Calculate investors' required rate of return from the company's common stock.
 - Calculate the company's cost of retained earnings and cost of a new stock issue.
6. **(Common equity—dividend-growth model)** A company's common stock is currently selling for \$24.00 per share. The company recently paid an annual dividend of \$1.60 per share, and investors forecast that the dividend will grow to \$3.30 in 10 years. An investment bank has advised that a new issue could be sold for a flotation cost of 7% of face value.
- Calculate the annual dividend growth rate forecast for the company.
 - Calculate the dividend anticipated in one year.
 - Calculate investors' required rate of return from the company's common stock.
 - Calculate the company's cost of retained earnings and cost of a new stock issue.
7. **(Common equity—capital asset pricing model)** Today, you looked at *The Wall Street Journal* and the *Value Line Survey* to read about a company whose stock you follow. You discovered the following:

Treasury bond yield:	7.75%
Company's beta:	1.3

Calculate investors' required rate of return from this stock if the market price of portfolio risk is:

- 6.5%?
 - 7.2%?
 - 8.3%?
 - 9.5%?
8. **(Common equity—capital asset pricing model)** Treasury bonds currently yield 8.5%, and the market price of portfolio risk has been estimated to be 8.3%. Calculate investors' required rate of return from a stock with beta coefficient of:
- 0?
 - .75?
 - 1.0?
 - 1.25?
9. **(Common equity—bond-yield-plus-premium model)** A company's stock's historical return has

been 4% above its long-term bond yield. What would this relationship predict for investors' required rate of return from the stock if the bond yield were:

- 9%?
- 12%?
- 15%?
- 18%?

10. **(Common equity—bond-yield-plus-premium model)** A company's stock's historical return has been 5% above its long-term bond yield. What would this relationship predict for investors' required rate of return from the stock if the bond yield were:

- 8%?
- 11%?
- 13%?
- 16%?

11. **(Weighted average cost of capital—weights)** A company has the following right-hand side of its balance sheet:

Bonds payable	\$100,000
Preferred stock (250 shares)	25,000
Common stock (100,000 shares)	<u>75,000</u>
Total Liabilities + Equity	\$200,000

Bonds payable are currently priced at 85 (85% of face value) in the market, preferred stock is selling at \$110 per share, and common stock is selling at \$5 per share. Management has announced that it is targeting a capital structure composed of 40% debt and 60% equity. Of the equity, 15% is to be preferred stock with the remainder common stock. Calculate the weights to be used in the weighted-average cost of capital calculation if the weights are based on:

- The company's book values
- The company's market values
- Management's target capital structure
- Which of the above three alternatives is best? Why?

12. **(Weighted average cost of capital—weights)** A company has the following right-hand side of its balance sheet:

Bonds payable	\$250,000
Preferred stock (1000 shares)	100,000
Common stock (200,000 shares)	<u>400,000</u>
Total Liabilities + Equity	\$750,000

Bonds payable are currently priced at 115 (115% of face value) in the market, preferred stock is selling at \$70 per share, and common stock is selling at \$20 per share. Management has announced that it is targeting a capital structure composed of 65% debt and 35% equity. Of the equity, 10% is to be preferred stock, with the remainder common stock. Calculate the weights to be used in the weighted average cost of capital calculation if the weights are based on:

- The company's book values
- The company's market values
- Management's target capital structure

d. If management's target weights were not known, which of the other two weighting schemes would you use? Why?

13. **(Weighted-average cost of capital—calculation)** A company has the following capital costs and target capital structure:

	Cost	Proportion
Bonds payable	9.0%	35%
Preferred stock	15.5	20
Common stock	17.5	45
Total Liabilities + Equity		100%

Calculate the company's weighted-average cost of capital under each of the following scenarios:

- It is calculated correctly.
 - The financial manager accidentally omits the preferred stock from the calculation.
 - The financial manager accidentally treats the preferred stock as if it were the same as common stock.
 - The financial manager accidentally weighs each financing source equally.
14. **(Weighted-average cost of capital—calculation)** A company has the following capital costs and target capital structure:

	Cost	Proportion
Bonds payable	8.25%	50%
Preferred stock	11.0	10
Common stock	13.5	40
Total Liabilities + Equity		100%

Calculate the company's weighted-average cost of capital under each of the following scenarios:

- It is calculated correctly.
 - The financial manager accidentally omits the bonds payable from the calculation.
 - The financial manager accidentally treats the preferred stock as if it were the same as bonds payable.
 - The financial manager accidentally weighs each financing source equally.
15. **(Cost of capital schedule—one break point)** A company plans to raise new capital as follows:

	Cost	Proportion
Bonds payable	9.0%	35%
Preferred stock	15.5	15
Common stock (retained earnings)	17.5	50
Total Liabilities + Equity		100%

The firm forecasts it can retain \$1 million of new earnings. If it requires additional common equity, it will sell a new issue of common stock at a cost of 18.5%.

- Calculate the company's WACC using new retained earnings as the equity source.
- Locate the break point in the cost of capital schedule due to running out of new retained earnings.
- Calculate the company's WACC after it substitutes the new stock issue for retained earnings.
- Draw the cost of capital schedule.

16. **(Cost of capital schedule—one break point)** A company plans to raise new capital as follows:

	Cost	Proportion
Bonds payable	7.5%	30%
Preferred stock	10.0	10
Common stock (retained earnings)	11.5	60
Total Liabilities + Equity		100%

The firm forecasts it can retain \$4 million of new earnings. If it requires additional common equity, it will sell a new issue of common stock at a cost of 13.0%.

- Calculate the company's WACC using new retained earnings as the equity source.
 - Locate the break point in the cost of capital schedule due to running out of new retained earnings.
 - Calculate the company's WACC after it substitutes the new stock issue for retained earnings.
 - Draw the cost of capital schedule.
17. **(Cost of capital schedule—multiple break points)** The firm of Problem 15 also forecasts the following: (1) if it sells more than \$250,000 of bonds, the cost of bond financing will rise to 10.0%, and (2) if it sells more than \$400,000 of preferred stock, the cost of preferred-stock financing will rise to 16.5%.
- Calculate the break point caused by running out of the cheaper bond financing.
 - Calculate the break point caused by running out of the cheaper preferred-stock financing.
 - Calculate the WACC in each interval.
 - Redraw the cost of capital schedule.
18. **(Cost of capital schedule—multiple break points)** The firm of Problem 16 also forecasts the following: (1) if it sells more than \$6 million of bonds, the cost of bond financing will rise to 9.0%, and (2) if it sells more than \$5 million of common stock, the cost common stock financing will rise to 15.0%.
- Calculate the break point caused by running out of the cheaper bond financing.
 - Calculate the break point caused by running out of the cheaper common stock financing.
 - Calculate the WACC in each interval.
 - Redraw the cost of capital schedule.